Effect of abiotic stress on carotenoids accumulation in pumpkin plants under light and dark conditions

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Abstract

In nature, environmental factors highly influence the carotenoid composition in pumpkin plants and these factors were difficult to control; thus, carotenoid content is varied quantitatively and qualitatively. However, certain parameters can be controlled and this can be conducted in the laboratory through biogenesis manipulation. This approach uses environmental stress as a tool to alter the carotenoid pathway in the plants. The main objective of this study was to observe the inhibiting and enhancing effect of abiotic stress on individual carotenoid accumulation in pumpkin plants under light and dark conditions. The abiotic stresses used were plant elicitors which consisted of Ultra Violet light exposure, Polyethylene Glycol 4000, Salicylic Acid, and half strength nutrients using Murashige and Skoog Salt. After two weeks of treatments, the pumpkin leaves and stems were harvested, freeze dried and extracted to determine the carotenoids compound using High-Performance Liquid Chromatography (HPLC). Results showed that there was a significant difference ($p < 0.005$) of lutein content (2.668 + 0.565 mu g/g) in pumpkin leaves once exposed to Ultra Violet light with the absence of beta-carotene compared to the control treatment; lutein (3.119 +/- 0.210 mu g/g) and beta-carotene (0.838 + 0.05 mu g/g). There were significant differences of carotenoids content under dark condition with the value of lutein at 0.472 + 0.008 mu g/g to 1.247 + 0.047 mu g/g and beta-carotene from not detected to 1.360 + 0.003. The highest amount of lutein in pumpkin stem was detected in the Salicylic acid treatment under light condition (0.930 + 0.101 mu g/g) and the highest amount of beta-carotene in the pumpkin stem was detected in the Salicylic acid treatment under dark condition (0.234 + 0.018 mu g/g). The carotenoid content varied in each treatment due to the adaptation of pumpkin plants with abiotic stress induced to them.

Keywords

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